

Patent Application of
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For

TITLE: HANDLE MULTI-PURPOSE TOOL

CROSS-REFERENCE TO RELATED APPLICATIONS

[001] Not applicable.

BACKGROUND-FIELD OF THE INVENTION

[002] The present invention relates to multi-purpose hand tools of the particular type utilized by electricians. More specifically, it relates to the tools which electricians keep in their pouch.

BACKGROUND-DESCRIPTION OF PRIOR ART

[003] The prior arts are well documented with pliers, screwdrivers, level, wire nut drivers and many other kinds of well known tools. Such tools are particularly useful to electricians who desire the capabilities of portable and compact multi-function tools to perform their tasks. This is even more important because of the fact that electricians must often work in fairly inaccessible locations, making the practicality of carrying numerous tools in their pouch often difficult or impossible.

[004] Examples of aforementioned well-known tools are as follows:

- [005] A pair of pliers is particularly useful for gripping wire terminals for splicing before wire nuts are connected.
- [006] A wire nut driver is particularly useful to screw the nut onto the end of wires to prevent an electrician's fingers from becoming tender and sore. Examples of wire nut drivers are illustrated in US Pat. No. 3,769,862 Nov /73 to Miller or US 2002/069715 A1 to Genco.
- [007] A plumb bob is generally useful to get a true vertical line when fixtures or posts are installed.
- [008] A level generally is useful when electrical paneling, gutters, conduits, lamps, or electrical boxes are fixed.
- [009] A measuring tape and a calculator is particularly useful to determine how many feet of wound wire remain on a reel.
- [010] A multi-tip screwdriver is generally useful for fixing screws on electrical boxes, connectors, paneling, etc.
- [011] A channel lock pliers or a file is particularly used to smooth burrs produced by a saw when an electrical conduit section is cut.
- [012] A needle nose pliers is generally useful to bend stripped wire terminals, which are often connected with a "U", or "O"-form at their ends.
- [013] A particular non-slip screwdriver is used at angled positions in which a screwdriver cannot be aligned with the screw axis.
- [014] A lever is used to align or remove parts fastened to walls.

[015] Accordingly, it is a principal objective of the present invention to provide a multi-purpose hand tool, which is able to perform the mentioned functions using just the subject matter of this invention.

SUMMARY OF THE INVENTION

[016] In its broadest description, this invention describes a multi-purpose hand tool comprising:

[017] A handle body which includes a cavity recessed from the upper end thereof, said cavity being of generally tapered section having open interior side walls, extending from said open end through half of said cavity, forming a socket next to the open end, sized to receive any of the most common sizes of wire nuts. A metallic insert extends inward from the interior side walls of said socket towards the bottom of said cavity, forming a second socket, sized to receive the most common gages of stripped electrical wire passed endwise through said first socket and into said second socket. Three pairs of grooves are formed in said interior side walls on opposite sides of said first socket, sized to receive the protruding wings of wire nuts. Three slots at the bottom of said metallic insert form a "Y"-end, sized to receive said stripped wire.

[018] A hole pierces the upper end of the handle transversally, crossing through said first socket on a cross-section, is sized to receive both ends of a flexible "V"-form hook.

[019] Various numerical columns are engraved and/or painted on the generally cylindrical exterior area of the handle extending coaxially downward from the upper end of said exterior area.

[020] The exterior area of said handle is bored out to receive an embedded level instrument, which includes a liquid substance, an air bubble, and a target point, so that said handle can be used as a level.

[021] Two pairs of magnets are inserted in the exterior area of said handle, transverse to said target point, proximate to both ends on a coaxial plane and parallel to the target point plane, in such a way that the handle can adhere to an iron surface.

[022] An elongated metallic bar is connected to the center of the cross section of the lower end of said handle body, extending coaxially outward, with a tip receiver connected to the other end of said bar, enabling various kinds of tip drivers to be utilized.

[023] Three steel wires connected on the bottom of the handle body enable said handle to be used as a scraper.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS.

[024] Fig. 1 is a perspective illustration, showing how the tool may be used as a non-slip screwdriver to fasten a screw at a coupling.

[025] Fig. 1A is a cross-sectional view of Fig. 1.

[026] Fig. 1B is a cross-sectional view from Fig. 1, taken along line B, showing the holes for plumb bob function, the wire nut socket, and wire twister area.

[027] Fig. 1C is a cross-sectional view from Fig. 1, taken along line C, showing the wire twister area and a pair of magnets.

[028] Fig. 1D is a cross-sectional view from Fig. 1, taken along line D, showing the bayonet area and parts for performing as a scraper tool.

[029] Fig. 2 is a perspective illustration of the preferred embodiment, showing how the tool may be used as a scraper to remove burrs from an electrical conduit.

[030] Fig. 3 shows a perspective view of the preferred embodiment, performing as a loop maker.

[031] Fig. 4 is a perspective view of the preferred embodiment, performing as a multi-tip screwdriver, fastening a screw.

[032] Fig. 5 is a perspective illustration showing how the tool may be used as a lever, removing an electrical conduit from a wall.

[033] Fig. 6 is a front view illustration, showing how the tool may be used to splice electrical wire terminals.

[034] Fig. 7 is a perspective illustration, showing how the tool may be used to determine what length of wound wire remains on a reel.

[035] Fig. 8 is an elevation illustration, showing how the tool may be connected to a hook and hung by a chord, to be used as a plumb bob.

[036] Fig. 9 is an elevation illustration, showing the tool stuck to a steel pipe by the magnets (no shown).

[037] Fig. 10 is a perspective illustration, showing how the tool may be used as a wire nut driver.

[038] Fig. 11 is a perspective illustration of the preferred embodiment carrying the tips therewith, showing a fingertip pushing a tip to take it out.

[039] Fig. 11A is a cross-section of Fig. 11.

[040] Fig. 12 is a perspective illustration of the preferred embodiment carrying the tips therewith.

[041] Fig. 13 is an elevation illustration of all the different prior art tools for which the present invention could totally or partially substitute.

[042] Reference Numerals in Drawings

| | | | |
|-----|-------------------------------------|------|--|
| 15 | Handle multi-purpose tool | 17 | Terminal wire-stripped |
| 18 | Terminal wire-stripped | 19 | Wire |
| 23a | "L"-form steel wire | 23b | Cavity for "L"-form steel wire |
| 24a | "L"-form steel wire | 24b | Cavity for "L"-form steel wire |
| 25a | "J"-form steel wire | 25b | Cavity for "J"-form steel wire |
| 26a | Loop for burr removal | 26b | Groove for loop of "J"-form steel wire |
| 27 | Filing, burrs | 28 | Electric conduit |
| 29 | Electric conduit cross section edge | 30 | Wire nut socket |
| 31 | Loop | 33 | Bore for "V"-form hook |
| 34 | Bore for "V" form hook | 35a | Groove of socket wire nut receiver |
| 35b | Groove of socket wire nut receiver | 36a | Groove of socket wire nut receiver |
| 36b | Groove of socket wire nut receiver | 37a | Groove of socket wire nut receiver |
| 37b | Groove of socket wire nut receiver | 38 | Metallic insert |
| 39a | Slot at the end of metal insert | 39b | Slot at the end of metal insert |
| 39c | Slot in end of metal insert | 39y | Slot base of "Y"-form |
| 40 | Level instrument | 41 | Bayonet |
| 42 | Target point | 43 | Liquid of level instrument |
| 44 | Cavity for instrument level | 45 | Wire |
| 46 | Bayonet free end | 47a | Terminal wire between bar and bayonet |
| 47b | Space to set stripped wire terminal | 48 | Magnets |
| 49 | Magnets | 50 | Bar |
| 51 | Tip receiver | 52 | Bar section for holding wire terminal |
| 53 | Slotted screw head | 54 | Surface to be fastened |
| 55 | Conduit section | 56 | Bar section in contact with conduit |
| 57 | Notch at tip receiver extension | 58 | Notch at tip receiver extension |
| 60a | Short Flat tip | 60a' | Flat section of short tip |
| 61a | Flat tip | 61b | Tip holder |
| 62a | Phillips tip | 62b | Tip holder |

| | | | |
|-----|-----------------------|-----|----------------------------------|
| 63 | Pivot point | 64 | Extension walls |
| 65 | Extension walls | 66 | Screw head |
| 67 | Coupling nut | 69 | Groove to accommodate forefinger |
| 70 | Hook | 71 | Hook angle |
| 72 | Cord | 73 | Hook end |
| 74 | Hook end | 77 | Pivot point |
| 78 | Wall section | 79 | Conduit strap |
| 82 | Numerical column | 83 | Reel edge |
| 84 | Reel of #14 THWN wire | 85 | Wire wound on reel |
| 86 | Wire gage indicator | 88a | Reference point |
| 88b | Floor mark | 89 | Gravity force direction |
| 92 | Spliced wires | 94 | Wire nut |
| 95a | Wire nut wing | 95b | Wire nut wing |
| 97 | Elastic band | 98 | Cavity for band |
| 99a | Fingertip | 99b | Tip holder upper end |
| 101 | Plumb bob | 102 | Lever |
| 103 | Multi tip screwdriver | 104 | Wire nut tool |
| 105 | Pliers | 106 | Needle nose pliers |
| 107 | Channel lock | 108 | Measurement tape and calculator |
| 109 | Non-slip screwdriver | 110 | Level |

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[043] The preferred embodiment of the present invention is a multi-purpose hand tool, integrally formed with an elongated body. Its generally cylindrical cross-section is composed of a substantially plastic or artificial resin material and comprises a handle body generally designated by the numeral 15 Fig. 1, having a fixed bar 50 at the center of its lower end. Said bar 50 includes a tip receiver 51 at its free end to which various kinds of tips 60a, 61a and 62a

Fig. 1T can be coupled. Said tip receiver 51 includes a particular cylindrical form extension 64, 65 Figs. 1 and 1A which is slightly wider than the tip receiver and is suitable to hide the flat section 60a' of the said shorter particular tip 60a. Said extension includes two "U"-form notches 57, 58 to provide access to said shorter tip 60a as it is shown in Figs. 1, 1A; said tip receiver 51 and tips 60a, 61a and 62a, obviously, become the preferred embodiment 15, a multi-tip screwdriver, shown in Fig. 4, with the ability of fastening a screw head 53 to a surface 54, as does the multi-tip screwdriver shown in 103 Fig. 13.

[044] The shorter particular tip 60a Figs. 1 and 1A is able to perform at a particularly awkward angle, at which a common screwdriver would slide, because it isn't aligned with the screw axis. Fig. 1 and 1A show how the flat section 60a' of said shorter tip 60a stays in place, even though the axis of the screw 66 and coupling nut 67 are not aligned with the tip's axis, as does a non-slip screwdriver 109 of Fig. 13.

[045] The multi-purpose tool 15 shows in Figs. 1A, 1B a cross-section of cavity 30, recessed from the upper end thereof, having upper interior sidewalls which include three pairs of grooves 35a, 35b; 36a, 36b and 37a, 37b formed in the handle material itself, equally spaced, extending from said open end to half the depth of said cavity 30, forming a socket/wire nut receiver, proximate said open end, sized to receive the protruding wings of any of the most common sizes of wire nuts, as does wire nut driver tool 104 Fig. 13.

[046] A metallic insert 38 in the lower half of said cavity 30, extending from the upper interior sidewalls downward, forming an interior portion consisting of a metallic socket 38 which includes three slots 39a, 39b and 39c, all of which are slightly wider than one stripped #12 wire and narrower than two stripped #14 wires, said slots being 120° apart, in the shape of a "Y"-form base 39y. Said insert 38 is shown at Figs. 1A, 1C and 6; said metallic insert socket 38 is

sized to receive the most common gages of stripped electrical wire ends 17, 18, passed endwise through said first socket 30 and into said socket 38. The wires 19 to be connected are passed endwise through the first socket into the second socket. The handle 15 is rotated and the stripped wires 19 are spliced as it is shown in Fig. 6, as do pliers 105 Fig. 13. Then, spliced wires 92 are passed into the wire nut 94, as shown in Fig. 10. The open end of the first socket is passed over the nut and the handle is slightly rotated until the nut's wings, 95a and 95b, pass into grooves 37a and 37b. The nut 94 is screwed into place on the wires by rotating the handle, which applies substantial torque to complete the work when it is rotated by hand 93, as does wire nut driver 104 Fig. 13.

[047] Holes 33, 34 transversally pierce the upper end of handle 15. Said holes 33, 34 cross through the first cavity 30 Figs. 1A, 1B on one cross-sectional line and are suitable to receive a "V"-form flexible hook. The "U"-form hook 70 is made of flexible steel wire, so that both ends 73, 74 close when it is compressed by hand. It returns to its open position when pressure is released. Thus, the "U"-form hook 70 is coupled in place by passing the hook ends 73, 74 into holes 33, 34 from the inside to the outside, via cavity 30. Thus, when the cord 72 is connected at angle 71 of the "U"-form hook 70 and it is hung at the reference point 88a, as it is shown in Fig. 8, the multi-purpose tool is suitable to be used to compare the parallelism with gravity force direction 89 and the floor mark 88b, as does a plumb bob 101 Fig. 13.

[048] Various numerical columns, engraved and/or painted on the generally cylindrical exterior area of the handle 15, extend coaxially downward from the upper end of said exterior area. As it can be seen in Fig. 7, the handle body 15 is placed in such a way that the upper end abuts into the wound wire 85 on the reel 84. Then, it is possible to read the numeral in the column

82 which corresponds to the reel edge 83, to determine the amount of wound wire 85 remaining on a reel 84, as does a measurement tape and calculator 108, shown in Fig. 13. Notice that the wire gage number and insulation type 86 are near the numerical columns.

[049] Fig. 1A shows a circular cavity 44 in the exterior area of the handle body 15, wherein a sealed container 40 is embedded, said container 40 made of a transparent material and including a liquid substance 43 and an air bubble therein, as well as a target point 42 traced on the exterior area of said transparent container 40. Thus, the preferred embodiment of the present invention could be placed in such position that the target point 42 could be used to compare the horizontality with gravity force direction 89, as shown in Fig. 9, as does a level 110 Fig. 13.

[050] Two pairs of magnets 48, 49 are embedded at the exterior area of handle body 15. Both of said magnet pairs 48, 49 are placed on the same plane, diametrical and parallel to the target point 42 plane, as it is shown in Fig. 1A. Said two pairs of magnets 48, 49 enable the handle body 15 to adhere to any iron surface, so that the target point 42 can be observed as shown in Fig. 9. Thus, the preferred embodiment of the present invention may be used as a magnetic level 110, as shown in Fig. 13.

[051] Three "L"-form cavities 23b, 24b y 25b, 26b, are separated by 120° at the lower end of the handle 15, of which the shorter sides are grooves extending as three radius from the exterior edge to the center and continuing coaxially inward as three flanges proximate and perpendicular to the bar 50, as it is clearly shown in Fig. 1A, 1D.

[052] Two "L"-form steel wires 23a, 24a are embedded in said "L"-form cavities 23b, 24b and a "J"-form steel wire 25a is embedded in said "L"-form cavity 25b, 26b. Notice that said "J"-form steel wire includes a loop at its free end. In Fig. 2, it clearly shows the preferred embodiment 15 can perform as a scraper to remove burrs 27 from the edge 29 of a cut piece of

electrical conduit 28 by rotating the handle body 15, as commonly do electricians, using channel locks 107 of Fig. 13. Notice that the loop 26a performs to remove burrs 27 inside and outside of conduit 28.

[053] Figs. 1A, 1D and 3, show a bayonet form steel wire 41 of circular cross-section connected to the upper end of the tip receiver 51, extending upward and having a free end 46 which is apart from bar 50. Said free end 46 is suitable to make any kind of loop 31, even a closed "O" form loop 47a on a stripped wire terminal 45, by setting it on the space 47b between the bar section 52 and the bayonet offset 46 and rotating the handle body 15, as shown in Fig. 3. Thus, the preferred embodiment performs as a needle-nose pliers 106, Fig. 13.

[054] Fig. 5 shows that the preferred embodiment may be used as a lever to align or remove electrical conduit 55 or the like affixed to a wall 78. By setting the end of the bar 50 between an affixed electrical conduit 55 and the wall 78, and pulling the handle body 15 so that the bar 50 pivots at its free end 77, the bar 56 puts pressure on the conduit 55 and strap 79. Thus, the preferred embodiment performs as the lever shown 102 in Fig 13.

[055] Additional Embodiment

[056] Additional embodiment is shown in Figs. 11 and 11A. In this case, the hand tool 15 includes various additional elongated cavities 61b, 62b. An elastic band 97 is placed in a groove 98 encircling said elongated cavities 61b, 62b, which are designed to keep a set of tips 61a, 62a integrated with said hand tool 15 therein. Said elongated cavities 61b, 62b are positioned in the exterior area all around the hand tool 15, extending coaxially about mid-length along the handle body 15, each cavity 61b and 62b alternating with an open strip alongside. Said cavities are slightly wider at the top, including a circular form 99b. Both the ramp form 63 and the wider upper end 99b of said cavities allow that a tip 62a pivots when it is pushed by a fingertip 99a, in order to remove tips.

[057] Alternative Embodiment

[058] There is another different possibility with regard to the position of the cavities 61b, 62b to keep a set of tips 61a, 62a integrated with the hand tool 15, as illustrated in Fig. 12, which shows said cavities 61b, 62b positioned around the lower end of said hand tool 15. An elastic band 97 is placed in a groove 98, which encircles said elongated cavities 61b, 62b (including an open strips between cavities and two open ends to provide withdrawal of said tips 61a, 62a, either upward or downward by an open end at the bottom or downward by pushing with a fingertip at the upper end of said cavity) and is accessible by the groove 69 around hand tool 15.

[059] Advantages:

[060] From the description above, a number of advantages of my handle tool become evident:

- [061] A lesser amount of artificial resin or plastic is used to manufacture it.
- [062] Substitute partially or totally the functions of the ten aforementioned prior arts.
- [063] A drastic reduction in the tool pouch weight.
- [064] No moving parts are needed to perform its several functions.
- [065] A durable multi-function hand tool.
- [066] A greater performance and productivity of the operator.
- [067] It is easier to set the wire nut in the socket than in prior arts.
- [068] The manufacturing cost is less than some of the prior art for which my invention substitutes.
- [069] Easily identifiable by touch.